CHAPTER 1

General Physiology

CELL PHYSIOLOGY

LONG ANSWER

Q1. List the functions of:

a. Cell membrane
- Protects the cell.
- Helps maintain a constant internal environment.
- Helps transport substances into and out of the cell.

b. Mitochondria
- The powerhouse of the cell, producing ATP.
- Plays a role in apoptosis (programmed cell death).
- Contains mitochondrial DNA to synthesize proteins.

c. Lysosomes
- Digest damaged cellular structures.
- Break down food particles ingested by the cell.
- Destroy pathogens such as bacteria.
- Facilitate autolysis of damaged and dead cells.

d. Endoplasmic reticulum
- Rough endoplasmic reticulum (RER): Involved in protein synthesis.
- Smooth endoplasmic reticulum (SER): Involved in steroid synthesis and detoxification of harmful substances.
- Sarcoplasmic reticulum: A modified form of the endoplasmic reticulum, involved in skeletal and cardiac muscle contraction.

e. Ribosomes
- Ribosomes are either free in the cytoplasm or attached to the endoplasmic reticulum and are the sites of protein synthesis.

f. Golgi apparatus
- Receives proteins from the endoplasmic reticulum and packages them into vesicles.
- Synthesizes various glycolipids.

TRANSPORT ACROSS CELL MEMBRANE

SHORT ANSWERS

Q1. Classify transport across cell membranes.

Transport across the cell membrane is classified in Fig. 1.1.

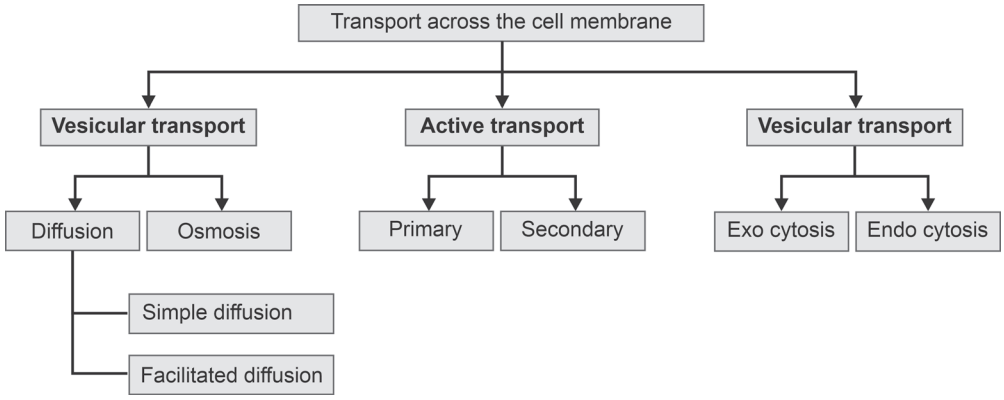


Fig. 1.1: Classification of transport across cell membrane

Q2. Differentiate between active transport and passive transport.

Differences between active and passive transport are listed in Table 1.1.

Table 1.1: Differences between active and passive transport

Passive transport	Active transport
Movement occurs along the concentration gradient	Movement occurs against the concentration gradient
No energy required	Energy required
Example: Diffusion of gases	Example: Na^+-K^+ ATPase pump

Q3. Differentiate between simple diffusion and facilitated diffusion.

Differences between simple and facilitated diffusion are listed in Table 1.2.

Table 1.2: Differences between simple diffusion and facilitated diffusion

Simple diffusion	Facilitated diffusion
Does not require transporters	Requires transporters
No saturation seen	Saturation seen
Occurs slowly	Occurs faster
Example: Diffusion of oxygen and carbon dioxide through the cell membrane	Example: Transport of glucose via GLUT transporters in RBCs

VERY SHORT ANSWER

Q1. Define osmosis.

Movement of water molecules from its region of higher concentration to its region of lower concentration across a semipermeable membrane.

BODY FLUIDS

SHORT ANSWERS

Q1. Classify body fluid compartments. Give their normal value.

The classification of the body fluid compartments is listed in Fig. 1.2.

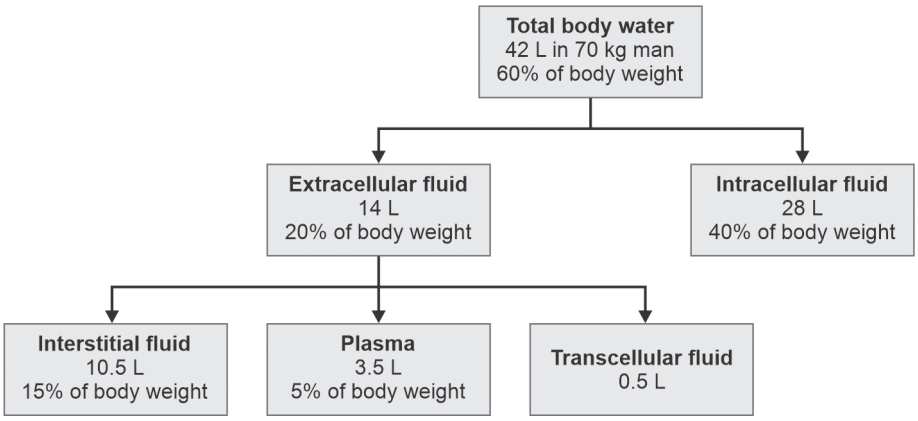


Fig. 1.2: Classification of body fluid compartment

Q2. Mention the different dyes used to measure the body fluid compartments.

The dyes used to measure body fluid compartments are mentioned in Table 1.3.

Table 1.3: Dyes used to measure body fluid compartments

Body fluid compartment	Dye used
Total body water	Tritium oxide, deuterium oxide
Extracellular fluid	Inulin, thiosulfate
Plasma	Evans blue, serum albumin labeled with radioactive iodine
Intracellular fluid	Cannot be measured using a dye
Interstitial fluid	Cannot be measured using a dye

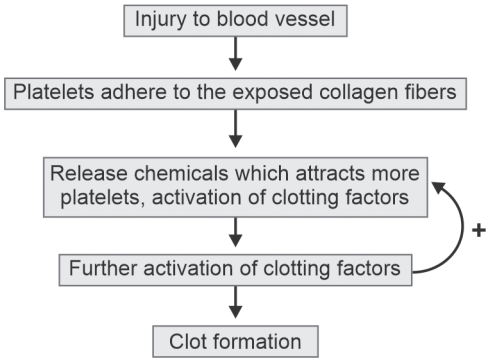
Q3. Define homeostasis. Give two examples of positive and negative feedback mechanisms.

Homeostasis is the maintenance of a constant internal environment.

Positive feedback examples:

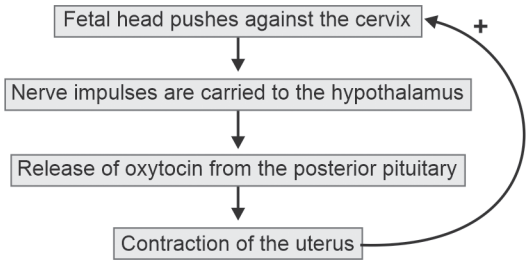
- Clot formation (Flowchart 1.1)

Flowchart 1.1: Positive feedback mechanism—clot formation



- Parturition reflex (labor) (Flowchart 1.2)

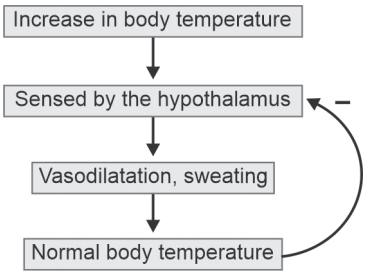
Flowchart 1.2: Positive feedback mechanism—parturition reflex



Negative feedback examples:

- Body temperature regulation (Flowchart 1.3)

Flowchart 1.3: Negative feedback mechanism—body temperature regulation



- Blood glucose regulation (Flowchart 1.4)

Flowchart 1.4: Negative feedback mechanism—blood glucose regulation